

Eastham Pilot Permeable Reactive Barrier (PRB) Update

October 2, 2020

Meeting Participants:

National Park Service – Lauren McKean, Sophia Fox

Town of Eastham – Jane Crowley

ES&M – Doug Heely, Brooke Paulsen, Lisa Flynn

MT Environmental – Jim Begley

GHD Engineering – Jeff Gregg, Jessica Janney

Eastham Pilot PRB Installation – March/April 2020

- 21 Injection points along a single linear treatment line for substrate injection at 10-foot intervals forming a PRB approximately 200 feet long and up to 12 feet wide
- Vertical treatment (injection) interval of 43 feet along the 200-foot line. Substrate was injected in 5-foot lifts (injection screen interval) from the bottom up
- Injection of approximately 31,000 gallons of substrate total (~1500 gallons of dilute solution per injection point). The substrate mix consisted of:
 - 6,600 gallons of 60% emulsified soybean oil diluted to 14% with water
 - 264 gallons of 60% sodium lactate added evenly into the diluted EVO solution on-site prior to injection
 - 550 pounds of sodium bicarbonate and 550 pounds of calcium carbonate evenly mixed into the injection solutions as a pH buffer to maintain circumneutral groundwater pH conditions



LEGEND

- MONITORING WELL
- COUPLET MONITORING WELL
- TRIPLET MONITORING WELL
- PIEZOMETER

- DEMONSTRATION PRB
- INJECTION POINT

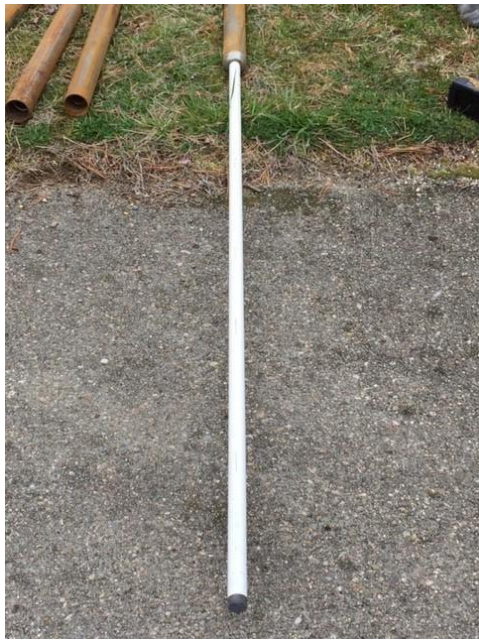


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SCALE FEET

SOURCE: 1) MASSGIS CATALYNE FOR PARCELS AND BOUNDARY CONTOURS; 2) GOOGLE EARTH PRO AERIALS; 3) TRANSMIT NON-COMMUNITY PUBLIC WATER SUPPLY PLAN PERMITTED FOR NAUSET REGIONAL SCHOOL DISTRICT BY MINNETT & ASSOCIATES, INC. DATED AUGUST 4, 2009; 4) ENVIRONMENTAL MONITORING - AERIAL MONITORING PLAN PERMITTED FOR EASTHAM LANDFILL, OLD CHURCH RD, EASTHAM, MA, BY MINNETT ENVIRONMENTAL ASSOCIATES, INC. 90 RAILROAD, MA, DATED MAY 11, 2010.

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SCALE FEET

<div>PREPARED BY</div> <div><div>Boston, MA 617-228-1000 Portland, ME 207-759-5880 Newburg, NY 315-540-0280 www.esandm.com</div></div>	<div>TITLE</div> <div>PRB SITE PLAN WITH AERIAL</div>			
<div>PREPARED FOR</div> <div>TOWN OF EASTHAM</div>	<div>DRAWN</div> <div>CMM</div>	<div>CHECKED</div> <div>BP</div>	<div>APPROVED</div> <div>DH</div>	
	<div>DATE</div> <div>7/14/2020</div>		<div>PROJECT NUMBER</div> <div>8015-04</div>	
<div>LOCATION</div> <div>NAUSET ROAD EASTHAM, MASSACHUSETTS</div>	<div>PLOT</div> <div>4-24001</div>	<div>FILE</div> <div>EASTHAM LANDFILL 2020.DWG</div>	<div>FIGURE 1</div>	

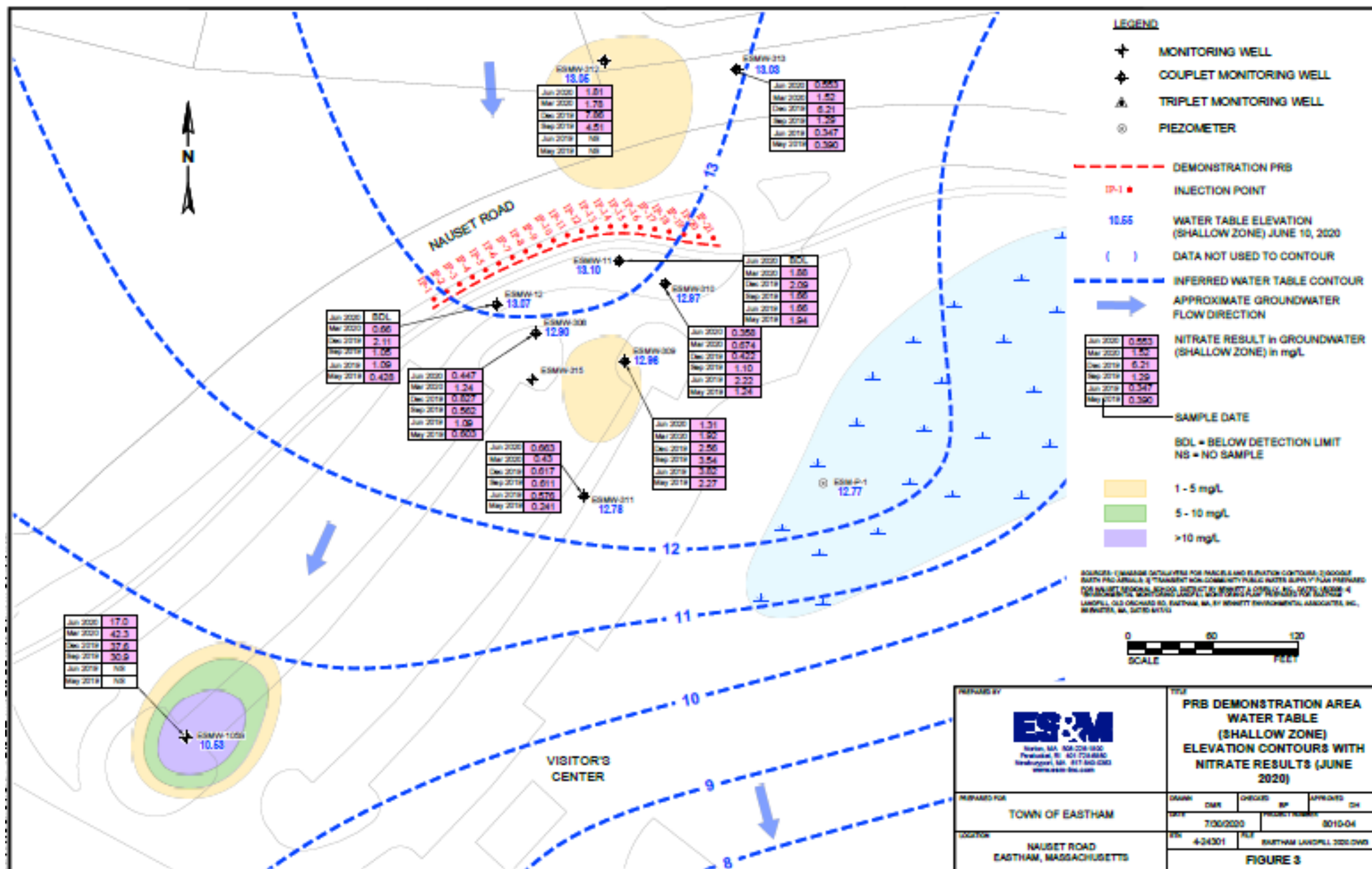


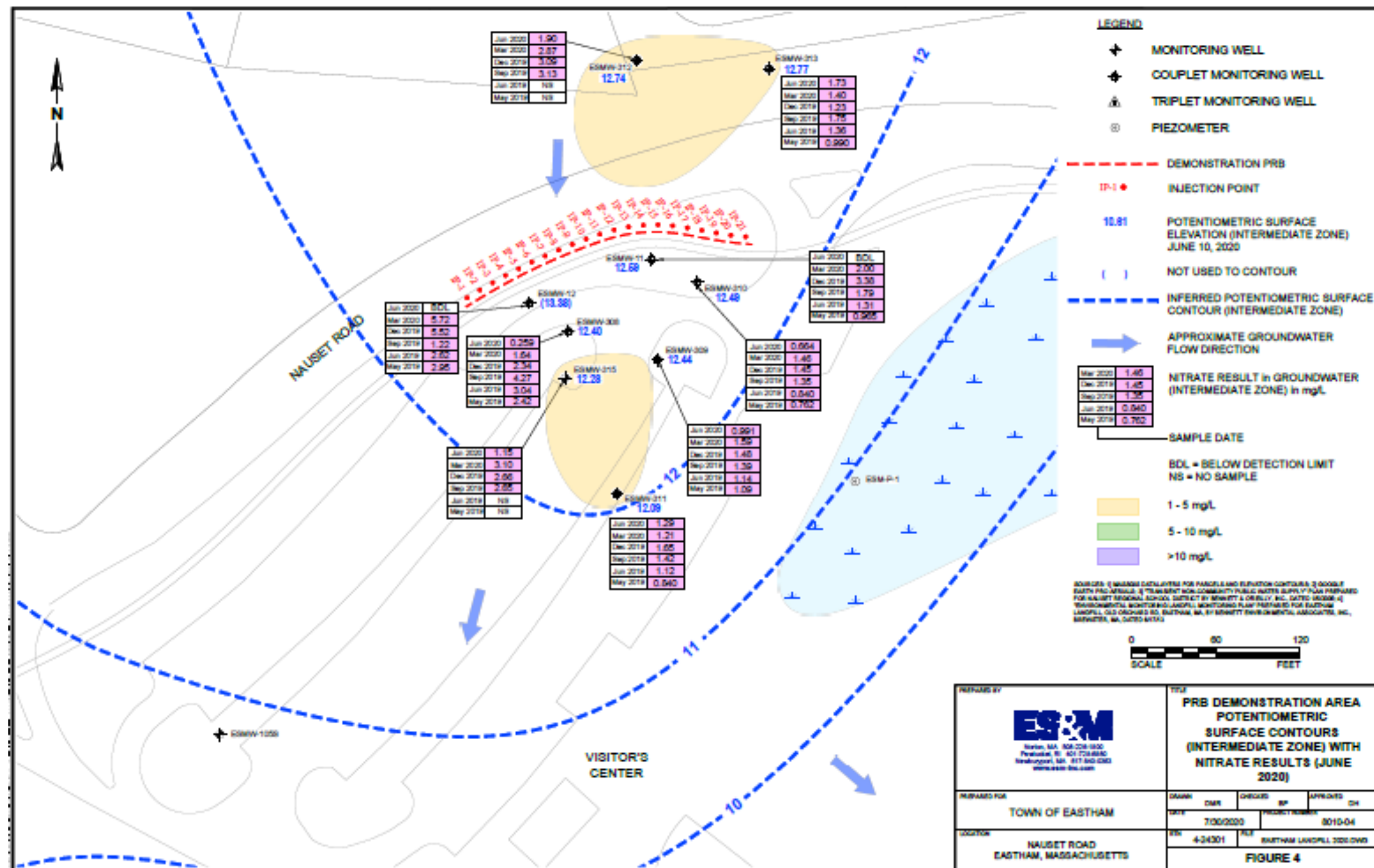
PRB Installation Photos



Post-Injection Monitoring Program

- Quarterly groundwater monitoring
 - Water level gauging
 - Collection of field parameter data
 - DO, ORP, Temperature, Specific Conductance, pH
 - Collection of groundwater samples for laboratory analysis
 - Monitoring wells upgradient and downgradient of PRB, screened across water table (shallow zone) and within intermediate depths in the aquifer
 - Monitoring wells purged until field parameters stabilize
 - Standard analysis includes total nitrogen, ammonia, nitrate, nitrite, dissolved iron, dissolved manganese, chloride and sulfate
 - Additional analysis includes dissolved organic carbon, dissolved arsenic, methane, and alkalinity





Future Schedule

- Continue post-injection quarterly monitoring
 - Next monitoring event scheduled for December 2020
- Quarterly monitoring reports
- 2020 Summary Report (early 2021)

SPVC Septic System Upgrades

- Installation schedule update
- System monitoring/sampling data sharing
- Possible expansion of PRB groundwater monitoring program